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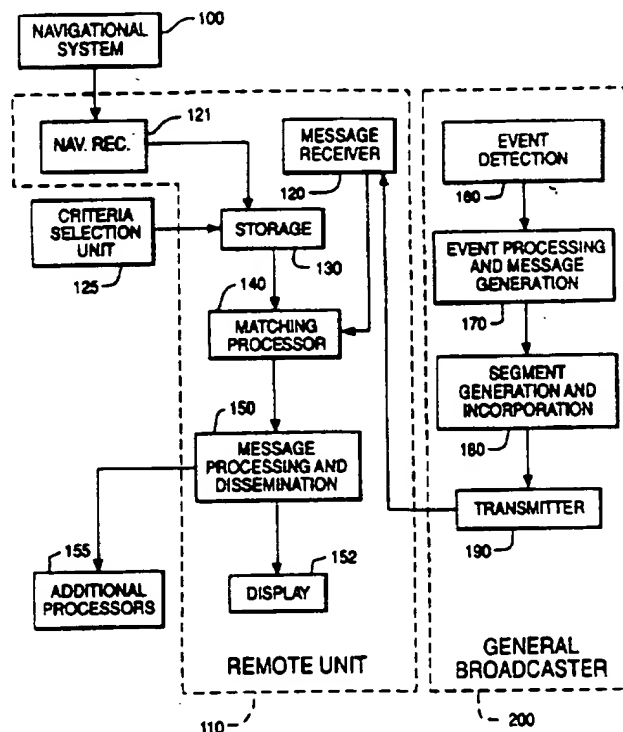(30) Priority Data:
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(71) Applicant: THE MITRE CORPORATION [US/US]; 202 Burlington Road, Bedford, MA 01730-1420 (US).

(72) Inventors: ERNST, Darrell, E.; 8720 Chipita Park Road, Chipita Park, CO 80809 (US). MCMILLAN, Donald, R.; 6220 Moorfield Avenue, Colorado Springs, CO 80919 (US). FOLK, Thomas, L.; 618 Southern Cross Drive, Colorado Springs, CO 80906 (US). ROGERS, Steven, R.; 5510 Broadmore Bluffs Drive, Colorado Springs, CO 80906 (US).

(74) Agents: HUNT, Ross, F., Jr. et al.; Larson and Taylor, 727 23rd Street, South, Arlington, VA 22202 (US).

(54) Title: LOCATION BASED SELECTIVE DISTRIBUTION OF GENERALLY BROADCAST INFORMATION

(57) Abstract

A system for determining whether information broadcast by a general transmitter is relevant to a particular user based on the location, velocity and/or time of an object of interest includes a remote terminal (110), a general broadcasting unit (200), a transmitter (190) at the general broadcasting unit for broadcasting messages including a segment comprising a region, a velocity and/or a time corresponding to an event, as well as an event specific tag, and storage (130) for storing selection criteria including current position, time and/or velocity information of the use and/or manually entered data of interest. The selection criteria may also include event specific tags. The receiver (120) at the remote terminal (110) receives the messages from the transmitter (190) at the general broadcasting unit (200). A navigational receiver (121) may also be used to acquire navigational information from an appropriate external source. A matching processor (140) at the remote terminal (110) evaluates the segment in the messages, determines if the segment sufficiently matched the stored election criteria and outputs a match signal. A processor (150) in the remote unit (110) receives the match signal, and processes and disseminates the message in accordance with the match signal.

LOCATION BASED SELECTIVE DISTRIBUTION
OF GENERALLY BROADCAST INFORMATION

Background of the Invention

5   Currently, region-specific information is disseminated by predetermined point-to-point communication or by general broadcast which must be manually monitored in order to extract information peculiar to a position, velocity and time of interest.

10   For example, marine weather data is continuously broadcast. However, mariners must monitor the broadcast for long periods of time in order to obtain the information peculiar to their region. Even then, the exact region affected may require computation or

15   may be ambiguously defined. There is also the possibility that the user may miss information of interest because he or she occupies an unknown location, is unfamiliar with the region, or uses a different frame of reference, among other reasons.

20   Another example is tactical ballistic missile (TBM) warning, which is derived from space and ground based sensor data, and is provided through a variety of broadcast and general purpose communications systems to a small subset of in-theater forces.

25   Currently, such warning requires transportable processing stations that can generate information about specific situations in the field but cannot

directly communicate with all individuals affected. The timeliness, reliability, and dispersion of information under these conditions are of concern. Because warning is in the form of geographical

5   coordinates and time of predicted impact, users must interpret the data to determine if the warning affects them.

Some current commercial systems are using GPS information to select relevant data from computer

10   based files such as appropriate electronically stored maps for use in automobiles. These are useful for relatively static information but fail to address dynamic environmental or combat factors.

U.S. Patent No. 5,243,652 to Teare et al.

15   discloses a database access system in which each mobile user has a positioning system which transmits position information to a central facility. This central facility then grants or denies database access depending on the geographical location of the mobile

20   user.

U.S. Patent No. 4,860,352 to Laurance et al. discloses a system in which a satellite system determines the position of a transmitter at a first location and a receiver at a second location. The

25   transmitter position is appended to the received message which is sent by the satellite system to the

receiver. The receiver receives the appended message, extracts the transmitter position data and compares the extracted transmitter position with a stored transmitter position. If the positions correlate, the receiver knows it has received an authentic message.

None of these devices allow for automated receiver discrimination of any message broadcast generally in order to only disseminate relevant messages.

Summary of the Invention

It is therefore an object of the present invention to provide a system which is capable of determining whether information broadcast by a general (whether global, regional or local) transmitter is relevant to a particular user based on the location, velocity and/or position of an object of interest.

In accordance with the present invention, these and other objects are achieved by providing a communication system including a remote terminal, a general broadcasting unit, a transmitter at the general broadcasting unit for broadcasting messages including a segment comprising a region, a velocity and/or a time, a receiver at the remote terminal for receiving messages from the transmitter, and a storage for storing data selection criteria. A navigational

receiver may receive current position, velocity,
and/or time information for that remote terminal to be
stored as data selection criteria. Data selection
criteria may also be manually entered into the

5   storage. The segment may further include an event
specific tag. Event specific tags may be stored in
the storage in response to manual input and/or be
predetermined and stored in the matching processor.
A matching processor at the remote terminal evaluates

10   the segment in the messages, determines if the stored
data selection criteria satisfies a match condition to
the segment, and outputs a match signal. A message
processor in the remote unit receives the match
signal, and, when the match signal indicates it is

15   appropriate for the remote unit to receive the
message, processes and disseminates the message in
accordance with the match signal.

       Other objects, features and advantages of the
invention will be apparent from the following

20   description of the preferred embodiments.

Brief Description of the Drawing

       The invention will be described below in further
detail with reference to the accompanying drawings
wherein Fig. 1 is a block diagram of a system

25   according to the present invention.

Detailed Description of the Invention

The present invention is directed to a system which determines whether access to particular information transmitted by a broadcaster is appropriate for a particular unit remote from the broadcaster. The invention is particularly useful for implementing an addressing distribution system of situation awareness information. The present invention can use satellite provided services, such as the Global Positioning System (GPS), to acquire data and establish user relevance based on current location in real time.

Situation awareness encompasses timely understanding of factors within the operational environment which might affect the manner in which the user proceeds. Some specific examples of functions that could be supported are: 1) warning user of impending tactical ballistic missile (TBM) attack, 2) informing combatant of local friend/foe unit positions, 3) advising user on occurrence of Nuclear/ Biological/Chemical (NBC) events, 4) disseminating terrestrial conditions such as impassable mud, flood, fire or snowpack, 5) alerting police unit of nearby robbery in progress, 6) advising users (e.g., mariners) of severe weather conditions, 7) providing pilots with airport information, and 8) supplying

motorists with information such as location of other
vehicles in motion, accidents, areas under repair or
blocked, etc. Information might also include
appropriate situation-specific actions the user might
5   take.

        This capability can be implemented on any
hardware platform that interfaces with a global
positioning or navigation system or other
positioning/navigational inputs, and provides world-
10   wide communications connectivity with the sources of
the situation alert bulletins. Remote units that
receive, process, and display or operate on the
situation awareness information can be mobile,
transportable, or stationary.

15   The system of the present invention is shown in
Figure 1. The navigational system 100 may be, for
example, Loran or GPS, or any other source of
navigational information, e.g., position, velocity or
time. The present invention may operate with either
20   periodic or continuous information delivery systems.

        The general broadcaster 200 may include an event
detection unit 160 which detects an event. Examples
of events to be detected with a suitable detection
unit 160 include weather, enemy activity, criminal
25   activity. Detection unit 160 may detect the event
directly itself or may receive a detection signal from

an external source. Once detection unit 160 detects
an event, it outputs information to an event
processing and message generation unit 170. Message
unit 170 outputs a message generated in response to
the event detection output of detection unit 160 to a
segment generation and incorporation unit 180.
Incorporation unit 180 then defines a position, a
velocity and a time of effectiveness for a particular
message based, e.g., on a projected history of the
event, and incorporates this information as a segment
in the message. For time critical applications, the
time of effectiveness may be set to the same universal
clock unit used in positioning system 100.   The
segment may also advantageously include an event
specific tag which indicates the type of event
detected. This segment may be, for example, a header
or a footer on the message. The message containing
the segment is then transmitted by a transmitter 190.

The remote unit 110 includes a navigational
receiver 121 for receiving various information
including navigational information from navigating
system 100. A storage unit 130 stores position,
velocity and/or time information acquired from
navigating system 100 by navigational receiver 121
and/or other selection criteria inputs from manual
input unit 125. The selection criteria input may

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include other positions, velocities and/or times to
increase the amount of information disseminated, as
well as event specific tags to customize and reduce
the amount of information disseminated. This
5   information provides the basis for defining matching
conditions of interest to the user of remote unit 110.
It will be appreciated that there may be a plurality
of remote units 110, all receiving information from
positioning system 100 and broadcaster 200.

10   Receiver 120 receives messages transmitted by
broadcaster 200. It should be noted that for some
applications, the navigation system 100 may serve as
the general broadcaster. In this case, the
navigational receiver 121 serves as the message
15   receiver. Receiver 120 then outputs this message to a
matching processor 140. Matching processor 140
compares the information contained in the segment of
the message to the information stored in storage 130.
If the stored position, velocity and/or time
20   information are within matching conditions of the
position, velocity and/or time information for the
segment of the transmitted message, then the message
processing and dissemination unit 150 will process and
disseminate the information in the message. The
25   matching conditions typically consist of an
appropriate position and time window such that exact

correlation is not required. Further, information at
other regions of interest may be processed by storing
additional times, velocities and/or positions, e.g.,
time, velocity and/or position information based on a
5   projected trajectory of remote unit 110 or based on
other remote unit of interest. Additionally, matching
processor 140 may compare any event specific tags
included in the segment with any event specific tags
either stored or matching processor 140 and/or input
10   at criteria selection unit 125 and only allow messages
having appropriate event specific tags to be processed
and disseminated by unit 150.

Generally, the correlating requirement is a set
of user-specified radial distance to the event,
15   whether the user is heading toward or away from an
event area, whether the event is past, present, or
future relative to the user and the duration of the
event. Alternatively, the matching processor 140
could contain the criteria for predefined event types,
20   with appropriate segments, being generated by unit 180
in general broadcaster 200. Specific examples of
matching conditions would include whether a combatant
was within the circular error probable (CEP) range of
an impacting ballistic missile; remote user was within
25   the path of a severe thunderstorm, NBC cloud, flash
flood, or forest fire; or the path of the remote user

would intersect any of these events in the near future based on their respective velocities.

Dissemination may include audio, tactile or visual alarm or display, or any combination thereof,

5   in display unit 152 and may be provided to one or more users.   Dissemination may also include further processing at the processing unit 150 or at additional processing devices 155.

Although the present invention has been described

10   above relative to exemplary preferred embodiments thereof, it will be understood by those skilled in the art that variations and modifications can be effected in these embodiments without departing from the scope and spirit of the invention as defined in the claims

15   which follow.

What Is Claimed Is:

    1.   A communication system comprising:

    a general broadcasting unit comprising

        a message generating means for generating a message,

        a segment generating means for generating a segment comprising at least one of a region, a velocity and a time, for incorporating said segment into said generated message, and for outputting an incorporated message, said generated message and said generated segment, and

        a transmitter broadcasting said incorporated message;

    a remote unit comprising

        a receiver for receiving said incorporated message from said transmitter at said general broadcasting unit,

        a storing means for storing data selection information,

        a matching processor for evaluating said segment in said incorporated message, for determining if said data selection information of
said remote terminal satisfies a match condition to said segment, and for outputting a match signal, and

a disseminating means, which receives said match signal, for processing and disseminating said message in accordance with said match signal.

2. The system as recited in claim 1, wherein said remote unit is mobile.

3. The system as recited in claim 1, wherein said remote unit is transportable.

4. The system as recited in claim 1, wherein said remote unit is fixed.

5. The system as recited in claim 1, wherein said segment generating means incorporates said segment as a header on said message.

6. The system as recited in claim 1, wherein said data selection information comprises current position, velocity and time information of said remote unit.

7. The system as recited in claim 6, further comprising a navigational information receiver receiving said current position, velocity and time information from a global navigational system.

8.   The system as recited in Claim 1, wherein
said segment further includes an event specific tag.

9.   The system as recited in Claim 8, wherein
said matching processor includes predetermined, stored
event specific tags.

10.   The system as recited in Claim 1, further
comprising means for manually entering at least one of
position,   velocity,   time   and   event   specific
information into said storing means.

11.   The system as recited in claim 1, wherein
said   disseminating   means   includes   a   means   for
displaying said messages.

12.   The system as recited in claim 1, wherein
said disseminating means includes an alarm.

13.   The system as recited in claim 1, wherein
said data selection information comprises position,
velocity and time information of objects of interest
remote from said remote unit.

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14. The system as recited in claim 1, wherein said data selection information comprises a location remote from said remote unit.

15. The system as recited in claim 1, wherein said message generating means further comprises a detecting means for detecting an event and generating a message in response to said event.

16. A method of providing selection at a remote unit of generally broadcast messages from a broadcaster, comprising the steps of:

transmitting from said broadcaster a message including a segment comprising at least one of a position, a velocity, and a time;

storing data selection criteria at said remote unit;

receiving at said remote unit said transmitted messages;

comparing said segment in said transmitted message to said stored data selection criteria;

determining from said comparing step the occurrence of a match condition; and

disseminating said message at said remote unit upon occurrence of said match condition.

17.   The method as recited in claim 16, wherein said disseminating step includes displaying said messages.

18.   The method as recited in claim 16, wherein said disseminating step includes activating an aural alarm.

19.   The method as recited in claim 16, wherein said disseminating step includes activating a tactile alarm.

20.   The method as recited in claim 16, wherein said disseminating step includes activating a visual alarm.

21.   The method as recited in claim 16, wherein said disseminating step includes activating another device.

22.   The method as recited in claim 16, which, prior to said transmitting step, further comprises the steps of:
    detecting an event;
    generating an event message in response to said event;

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generating a segment defining at least one of a region, a velocity and a time; and

incorporating said segment into said event message to form said message.

23.   The method as recited in claim 16, wherein said storing data selection criteria step comprises manually entering at least one of position, velocity, time and event specific information.

24.   The method as recited in claim 16, wherein said storing data selection criteria step comprises receiving current position, velocity and time information of said remote unit.

25.   The method as recited in claim 16, wherein said transmitted messages received at said remote unit when transmitted from more than one broadcaster.

26.   The method as recited in claim 16, wherein said storing step comprises a plurality of data selection criteria and said comparing step comprises comparing said segment of said plurality of data selection criteria.
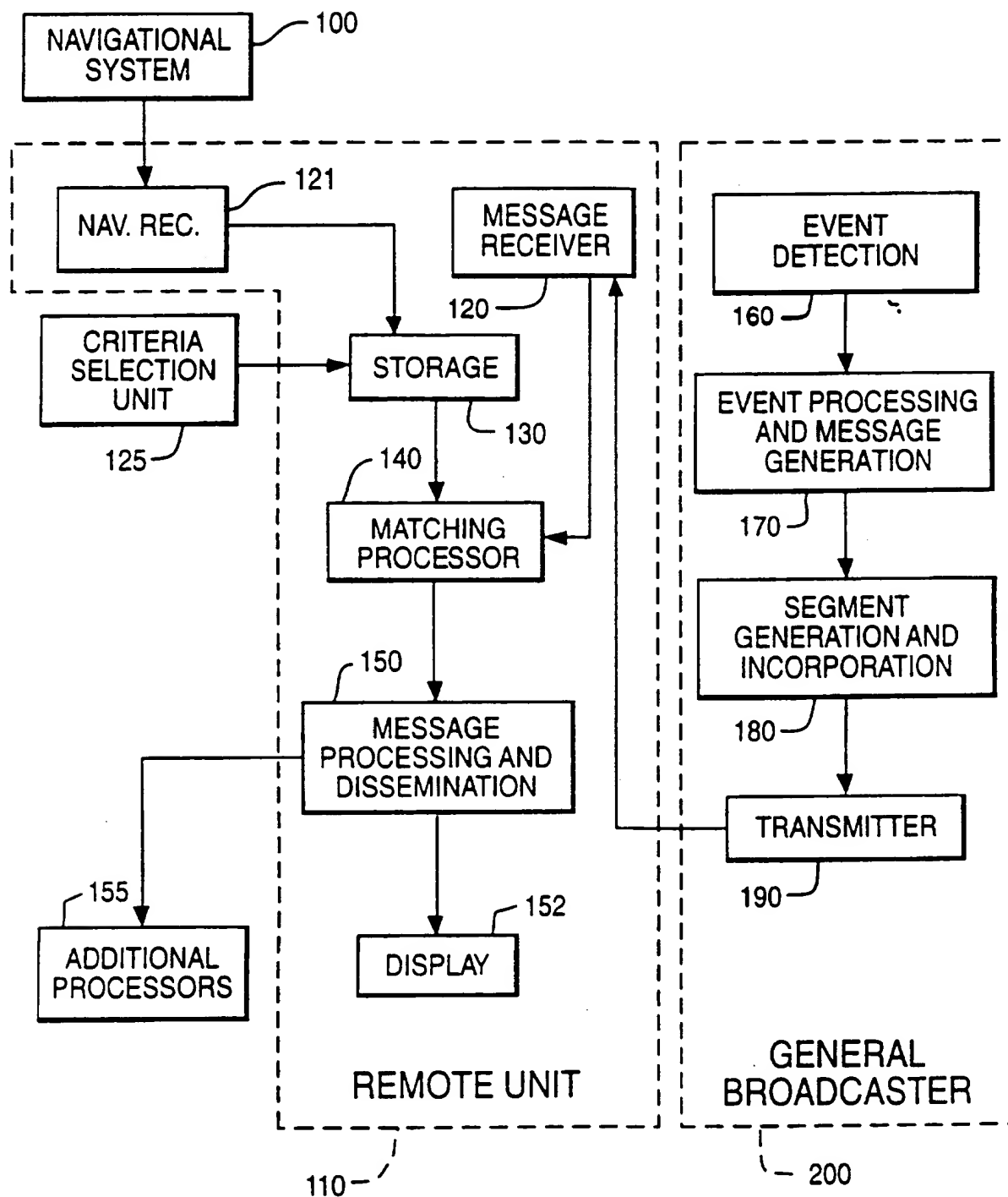
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/10170

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :HO4L 27/00, G08G 1/23
US CL : 375/37; 340/993

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 375/259, 340, 345; 340/993, 989, 988; 370/92, 85.1; 342/457; 364/449

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 5,095,532 (MARDUS) 10 MARCH 1992, col. 2, line 36 - col.4, line 19.	1-6,8-11,13 - 14,16-17, 19,23-26 ------------ 7,12,18,20-21.
Y	US, A, 4,097,695 (GRACE ET AL) 27 June 1978, col.4, line 30 - col.6, line 34.	1-14, 16-21, 23-26.
A	US, A, 5,311,197 (SORDEN ET AL) 10 May 1994, see abstract.	1-26.
A	US, A, 4,627,052 (HOARE ET AL) 2 December 1986, see abstract.	1-26.

☐ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)		
		"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 SEPTEMBER 1995	**20 DEC 1995**

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer TEMESGHEN GHEBERTINSAE
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4714

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